DOCUMENT RESUME

ED 323 191 SP 032 575

AUTHOR Nuthall, Graham
TITLE How Can Research on Teaching Help Teachers?
PUB DATE Nov 89
NOTE 55p.; Paper presented at the New Zealand Association for Research in Education (Wellington, New Zealand, November, 1989).
PUB TYPE Speeches/Conference Papers (150) -- Information Analyses (070) -- Viewpoints (120)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Classroom Research; Educational Research; Elementary Secondary Education; Foreign Countries; *Learning Processes; Literature Reviews; Models; *Research Utilization; Social Change; Teacher Attitudes; Teacher Characteristics; *Teacher Effectiveness; *Teaching Experience; *Theory Practice Relationship

ABSTRACT

Research on teaching does not play a significant role in the practice of teaching in schools despite the fact that the first scientific studies of teaching were reported nearly 90 years ago. Although there is clear evidence that practical classroom experience unaided by research is not a sufficient basis for effective teaching, it is also true that research on teaching has been unable to provide a more adequate basis for effective teaching. A brief history of research on teaching shows that, after having gone down several "blind alleys," such research has emerged with a clear focus on direct data gathering in the classroom itself. The last 30 years have seen considerable controversy about the appropriate methods for research on teaching, but what is needed to resolve questions of method and purpose is a clear picture of the kind of knowledge that research on teaching should produce. The paper describes a model of the kind of pragmatic knowledge that research should be producing if it is to be genuinely useful to teachers. The model includes both the theoretical and the practical dimensions of teaching in a single structure, tactics and monitoring signs that teachers need to run an effective program, and an account of the underlying learning and social processes connecting these tactics to the outcomes of classroom activities. (JD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED323191

HOW CAN RESEARCH ON TEACHING HELP TEACHERS?

Graham Nuthall

University of Canterbury

Paper given at the

New Zealand Association for Research in Education

Wellington, New Zealand. November, 1989

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

G. Nuthall

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

SP032575

BEST COPY AVAILABLE

ABSTRACT

Research on teaching does not play a significant role in the practice of teaching in our schools despite it being nearly ninety years since the first "scientific" studies of teaching were reported. Although there is clear evidence that practical classroom experience unaided by research is not a sufficient basis for effective teaching, it is also true that research on teaching has been unable to provide a more adequate basis for effective teaching. A brief history of research on teaching shows that it has gone down several "blind alleys" but emerged with a clear focus on direct data gathering in the classroom itself. The last thirty years have seen considerable controversy about the appropriate methods for research on teaching, but what is needed to resolve questions of method and purpose is a clear picture of the kind of knowledge that research on teaching should produce. In the final section of this paper I present a model of the kind of pragmatic knowledge that research should be producing if it is to be genuinely useful to teachers. This model includes both the theoretical and the practical dimensions of teaching in a single structure. It includes the tactics and monitoring signs that teachers need to run an effective programme. It also includes an account of the underlying learning and social processes that connect these tactics to the outcomes of classroom activities.

Introduction

The problem I want to address in this talk is: How, if at all, can research on teaching help teachers? By research on teaching, I mean research that is concerned with teaching effectiveness, or, more broadly, with how teachers affect children and children's development and learning. By "helping teachers" I mean providing teachers with something, a body of knowledge or information, that can facilitate their work, that can give them insights into what they do and that they can use to make their own teaching more effective.

One Hundred Years of Research on Teaching

It is now nearly a hundred years since the first research studies were published which applied the methods of science, as they were understood at that time, to problems about how and what teachers ought to teach. One of the earliest studies was carried out by Cornman in the 1890s and was designed to find out what effect, if any, teaching spelling had on children's ability to spell (Cornman, 1902)[1] . Since that time, there have been several

---

[1] Teachers in 14 classes in New York (grades 3 to 8) were asked not to take any formal spelling lessons, spelling drill, or spelling homework for three years. These classes were matched with 14 equivalent classes at the same grade levels. The spelling ability of the children in all 28 classes was tested during the 1897-98 year. The tests required writing words in sentences.

	Average number of words spelled correctly
Classes with spelling instruction:	78.17
Classes with no spelling instruction:	76.84

The difference (1.33 words) is not statistically significant (t = 0.89, df=13, p=0.39)

thousand studies carried out that have attempted, in various ways, to improve the quality of teaching and learning in classrooms.

However, despite its long history, this research has had very little, if any impact on the practice of teaching or on the teaching profession. There are very few easily available books which report and summarize research on teaching for teachers. The names of leading researchers in the area are not widely known. My impression is that teaching research is not often referred to in the training of teachers or in in-service training. And it is not used in making policy decisions about schools or teachers. For example, the discussion document put out by the Ministerial Working Party on *Assessment for Better Learning* makes no reference in its recommendations about the evaluation of teachers to research on teaching effectiveness or research on teacher evaluation.

There are, of course, some excellent examples of the use of research in the design of teaching programmes (such as in the design of the Reading Recovery Programme) but these are exceptions rather than the rule.

The Purpose of This Paper

What I want to do in this paper is to look clearly at why research on teaching has been very largely ignored by the teaching profession and by policy makers in education.

There are, of course, many political, social, and historical reasons why the teaching profession has developed the way it has, in this country and in similar Western countries. Without discounting the significance of any of these reasons, I want to pass them over in this paper and look at what it is about research on teaching that has prevented it from providing the teaching profession with the solid base of professional knowledge, expertise, and insights that effective research should be able to provide.

The Reasons Why Research on Teaching Has Had Little Direct Impact.

There are, it seems to me, at least five reasons given for why research on teaching has been of little help to the teaching profession. These are:

(a) research and teaching are incompatible,

(b) teaching is irrelevant to the learning and development of children,

(c) effective teaching is a matter of practical classroom experience,

(d) research on teaching has yet to show that it has anything to offer, and

(c) good research on teaching is just too difficult to carry out.

Let us consider each of these reasons and explore the evidence that exists to support or refute each of them.

Research and Teaching are Incompatible

This claim is based on the view that research is something which is objective and impersonal. It reduces experience to facts and numbers. On the other hand teaching is a personal, moral, creative endeavour. It

involves concern for the specific experience of individuals. It could never be 'captured' by the methods of science.

In my view, this is a valid criticism of much of traditional social and psychological research. The attempt to make the human sciences reflect, as far as possible, the methods and purposes of the physical sciences has lead to treating human experience as though it was identical with the physical world. The results have, as a consequence, been abstract, impersonal and difficult to relate to the individual experience of teachers.

There has, however, been a considerable change in the nature of research in the human sciences in recent years. While traditional methods are still being used by some, other methods which focus on the individual perceptions and personal meanings of individual teachers and children are also being used. The impact of these new research methods will become apparent later in this paper.

Teaching is Irrelevant to the Learning and Development of Children.

There are two versions of this second claim that teachers are irrelevant to the learning and development of children. The first is based on the belief that children's learning and development is essentially inner-directed. Children learn in their own way and in their own time. Teachers may help by providing a rich and stimulating environment, but trying to direct or control the processes of learning will do more harm than good. Some who take this view claim that there is too much teaching in schools and that it should be removed rather than made the object of research.

The second version of this claim identifies the social and political structures of race, class and gender as the major determinants of children's learning and development. Teachers are largely invisible automatons who simply reflect, in their behavior and attitudes, the beliefs and culture of the school and the social structures in which it is located. Teachers, as individuals, can do little or nothing to change this state of affairs. What needs to change is society itself.

There is now clear research evidence that teachers can make a substantial difference to the development of attitudes, skills and knowledge in their students. Much of the empirical evidence that was cited in studies of school effectiveness, such as the Coleman Report, which appeared to show that teachers had no effect, was produced by methods of data analysis that presumed that teacher effects were secondary to the effects of other variables (cf. Good & Weinstein, 1986). When this presumption is reversed and the data is analyzed in ways which look first for the effects that teachers do have, the evidence for the influence of out-of-school variables (e.g.social class) and fixed student characteristics (e.g. IQ and academic ability) starts to disappear.

Two things have confused this issue in the past. First there has been a tendency to confuse school or teacher effects with social change. Teachers can have little effect on matters of social and economic structure such as rates of unemployment. But it does not follow from this that they can have no effect on the knowledge, skills, and attitudes of the children themselves. Project Headstart in the United States did not alleviate poverty or change the distribution of unemployment, but the more effective Headstart programmes did change the lives of the children in them.

The second confusion has arisen from treating teachers as fixed variables. This assumes that teachers have the same effect on every day of the week, with every child, and every aspect of learning. When evidence is obtained and analyzed in ways which acknowledge the varying effects that a teacher may have at different times, with different children and different subject areas, the significant effects that teachers can have becomes clear.

All of those social and psychological variables, such as race, class, gender and academic aptitude, that are known to be related to children's learning of curriculum-relevant knowledge and attitudes, have their effects in the classroom. Consequently, it is in the classroom that the processes by which they have their effects need to be studied (Alton-Lee & Nuthall, 1989).

Effective Teaching is a Matter of Practical Classroom Experience.

There are those, and they are probably the majority of teachers, who believe that becoming an effective teacher is primarily a matter of learning from actual classroom experience. There is no doubt that this third claim is true of most teachers understanding of their own experience. Those who have been identified in the present system as the most effective teachers have gained their skills from extensive practical experience, and from sharing experiences with their colleagues. It does not follow, however, that practical experience is the best, or even a good guide to effective teaching.

Jackson, in the 1960s, published a very interesting book called *Life in Classrooms* in which he reported the results of interviewing and observing

a large number of teachers (Jackson, 1968). He asked them how they knew when their teaching was going well and when it was going badly. Teachers reported consistently that they knew when things were going well in their classrooms from children's immediate reactions. The signs they used were: the look on the children's faces, their body movements, their restlessness, their eagerness, the questions they asked or failed to ask, and the answers they gave or failed to give to questions[2] . This direct feedback that children give is immediate and powerful. Only rarely, and then suspiciously, do teachers use formal test results to judge how well they have taught something. Given the management problems inherent in continually co-ordinating the activities of 20-30 children in a classroom, it is difficult to see how it could be otherwise.

To question the value of this direct and immediate feedback, experienced by a teacher over many years in many different classes, is to question the value of direct human experience interpreted and evaluated by intelligent professionals.

But how good is our direct practical experience? Is the earth flat? Does the sun go round the earth? Is matter solid? Is yeast alive? Is it windy in Wellington? We know that in many areas, common experience is wrong and in other areas it is clearly correct. Where does teaching come in this spectrum?

---

2 I have had graduate students replicate Jackson's study several times. New Zealand teachers give almost identical responses to those Jackson found in Chicago.

The available evidence indicates that there are three aspects of classroom teaching experience where teachers may be misled by their own perceptions. These are:

(a) teachers' perceptions and memory of their own and the children's behavior,

(b). teachers' awareness of what children already know before being taught, and

(c). teachers' awareness of how much children retain of what they have been taught.

I would like to look briefly at the evidence for each of these claims because they have serious implications for the validity of practical experience in teaching.

(a) Teachers' Perceptions and Memory of Their Own and Children's Behavior.

First, one of the things you learn when you attempt to carry out systematic audio- or video-recording of classroom behavior is that teachers, students, and researchers may find the recordings of themselves to be seriously at variance with their internal images of their own behavior. This also occurs when teachers are trained to carry out systematic observations of their students' behavior. The following are three typical examples taken from a university course in behavior analysis which required teachers to set up systematic observations in their own classes.

Case A. A home science teacher was very worried about the frequency with which her students were not tidying up their materials at the end of class. It took three weeks of systematic observation before she believed that

her students were in fact tidying up almost all the time and that the problem was in her own perceptions and not in their behavior.

Case B. A Standard Four teacher was worried about two boys who were constantly on the move and never seemed to spend any time attending to set tasks. Systematic observations showed that she was right about one boy. He spent about 10% of the work time on set tasks. But she was completely wrong about the other boy. He spent 80% of his time on the set tasks.

Case C. A teacher was having difficulties with the lack of progress of a child in her class. She could see no reason for this difficulty because the child always seemed to be on task. Systematic observation revealed that the child had developed ways of appearing to be busy, but was actually doing almost none of the required work.

In each case, informal observations made by the teacher, while she was busily engaged in the day to day management of the whole class, had been seriously misleading. An interesting and important example of this same mis-perception has been reported by Karen Newton. She observed the classroom interactions between four teachers and their students in Auckland schools. She described one teacher who was clearly aware of equity issues and who believed that the girls in her class interacted with her about as frequently as the boys. Systematic observation showed that, in fact, more than 80% of her interactions were with boys (Newton, 1988).

(b) Not knowing what children already know.

One reason why teachers may find it very difficult to assess the effectiveness of what they are doing is because they often do not know the extent of

children's prior knowledge when they introduce a new topic. On the whole, children are very polite and will respond with interest when they already know what they are being taught or asked to learn.

In our studies of classroom learning we have found that the children already knew about 40% of the content of the science and social studies topics that the teachers were teaching (Nuthall & Alton-Lee, 1982).

Dr. Young Loveridge has reported children's knowledge of a wide range of mathematical skills and concepts at the beginning and end of their first year at school (Young Loveridge, 1989). She also asked the children's teachers which specific concepts and skills they had taught during the year. She found that on average 41% of the children already knew, at the time they entered school, each of the concepts and skills the teachers had been teaching them. For some of the concepts the teachers taught, over 80% of the children knew them when they entered school.

That the children in these classes were busy, interested and active during the time they spent on mathematics may well have been the case. That they were actually learning anything new may not have been the case.

(c) Lack of knowledge of long-term learning.

Finally, it is very difficult for teachers to have any knowledge of the long term effects of what they are doing. It would take an extraordinary feat of memory and perception for any busy teacher to systematically relate all of the occasions when a topic or skill comes up in the classroom (and what happened on those occasions) to the knowledge the child has a year or so

later, even if the teacher had knowledge of the child's achievements a year later.

Long term learning may involve any of the following types of effects:
(a) retention of specific information or skills after several months,
(b) the accumulated composite effect over time of learning a lot of different specific pieces of information or skills,
(c) the long term effect of changing a child's perception or understanding, or
(d) the accumulated composite effect of classroom experience on beliefs and attitudes.
Probably all of these effects are involved in the cumulative process which makes up a child's education. We may, at the present time, be spending a lot of time teaching the same things over and over again, unaware that what we are doing has no lasting effect, or has quite different long term effects from the more apparent short term effects.

To summarize this discussion, the evidence shows that practical classroom experience may not be a good basis for learning to teach effectively because teachers may have mistaken perceptions of what they and their students are doing, they may not be aware of what their students already know, and they may, of necessity, have very limited knowledge of the long term effects of what they do.

As Jackson has shown, practical experience is a good guide to running a busy classroom with active and enthusiastic students, but the learning which is taking place is not visible and may be easily misjudged. Research carried out in the 1930's by A.S.Barr and his associates at the University of Wisconsin (e.g. Barr, Torgerson, et al., 1935) has shown quite clearly that systems of

evaluating teachers based on direct observation and inspection do not relate to how effective teachers are at producing learning or attitude change in students. More recent studies have confirmed that teacher evaluation "by looking" does not relate to learning (Stodolsky, 1984).

As an aside, the data from one of the earlier studies carried out at the University of Canterbury (Wright & Nuthall, 1970) serendipidously made it possible to compare a group of experienced with a group of beginning teachers who all taught the same topic. The students taught by the beginning teachers learned, on average, the same amount as the students taught by the experienced teachers.

Research on Teaching Has Not Proved to be of any Value.

The fourth reason why the teaching profession has not made use of research on teaching is based on the claim that the fault lies in the research and not in the teaching profession. In my view there is considerable validity behind this claim. A lot of published research on teaching has been narrowly focussed or has not taken into account the full complexity of the classroom and the pressures that surround the day to day work of teachers. It has often been preoccupied with the requirements of traditional research procedures at the expense of the needs of teachers and the realities of the classroom. Some of the more recent ethnographic and interpretive studies of teaching have come closer to the "language" of teachers, but, as I will indicate later in this paper, there is still a need to look more closely at the kind of practical knowledge and understanding that teachers need and to design the research accordingly.

Good Research on Teaching is Too Complex to be Practicable.

There is a widely held belief that any attempt to take into account all of the differences that exist between teachers, between children, between curriculum areas, and between all of the other variables that impinge on teaching, would result in research which is just too complex to imagine. Certainly the results of such research would be far too complex to understand or use in any practical situation.

This reason, like the first reason cited above (that there is an incompatibility between research and teaching), is based on a valid insight into a lot of traditional social science research. This traditional research uses methods appropriate to simple problems to make claims about very complex problems. As I will indicate later in this paper, a lot of research on teaching has used methods which have oversimplified the complexities of teaching and of student learning. Such methods have produced misleading results and given the false impression that there were no other valid research methods capable of handling the complexity of the day to day life of classrooms.

Summary

I have claimed that research on teaching has had significant shortcomings. The question that now needs to be asked is whether these shortcomings justify the conclusion that research on teaching cannot be of any significant help to teachers. I have also claimed that practical experience has significant limitations as a guide to effective teaching. Is it possible that research on

teaching can be adapted to supplement or facilitate practical experience in a way that will provide the insight and knowledge that teachers need in order to improve their effectiveness?

There has , in recent years, been considerable rethinking of what genuinely facilitative research on teaching should be aiming to do and how it should be carried out. I want, in the remainder of this paper, to give you a picture of what this rethinking has achieved and of how the questions I have asked above should be answered.

The diagram in Figure 1 is an attempt to summarize the history of research on teaching over the last 90 years or so. A major characteristic of the research has been its concern for everything *but* the nature of teaching itself and the diagram depicts a series of blind alleys or wrong turnings that generated interesting areas of research in themselves, but avoided what ought to have been the central focus of the research.

Insert Figure 1 about here

The introduction of systematic empirical research into education began with considerable enthusiasm for the possibility of applying to teaching the same scientific methods that were being successfully applied to agriculture and medicine. At that time, writers understood scientific research to involve systematic and detailed observation. It was believed that by carrying out hundreds and hundreds of detailed observations and experiments, each dealing with some aspect of the teaching, all doubt, ambiguity and debate could be removed from education.

Some of the flavour of the claims being made is contained in the quotation from Professor O'Shea in an early issue of the *Psychological Bulletin* (O'Shea, 1906, p.357).

> "The belief is growing very strong among us that education can and ought to be treated as a phase of biological and psychological science. ... We seem to be losing interest in all theorizing that is not based directly and very evidently upon a close study of educational processes at first hand."

Research on Child Development

A lot of the early enthusiasm for the development of pedagogical science was channelled into the study of children's development. It was argued that the key to good teaching was understanding how a child's mind worked and what a child of a particular age was capable of and interested in doing. Effective teachers would be those whose teaching conformed to children's natural intellectual and social development.

This view became very popular and lies behind the considerable influence which Piaget's research has come to have on teachers and teacher training.

There are at least two problems with this view. First, it assumes that we already know how to teach effectively. If research can provide insights into the workings of the child's mind, then teachers will be able to select and apply appropriate methods from the repertoire of effective teaching methods that they have available.

Second, it takes for granted that children's development is largely independent of their classroom and other social experience. It assumes that the processes of development are an important cause of what takes place, or ought to take place, in classrooms. It ignores the alternative possibility, that the developmental processes that have been studied in children are a consequence of the way children are taught, and that different teaching methods might produce different development.

Recent research has shown that this assumption needs to be challenged. The best example is in the area of gender differences in children's development.

Until recently gender differences in interests and abilities were taken to be inherent and it was implied that teachers should adapt their teaching to these differences. More recent research has been based on the opposite view.

The Measurement of Intelligence and Achievement

A second early development was the search for scientific methods of assessing the capabilities and achievements of students. Clearly a pedagogical science, if it was to be a true science, needed precise instruments for measuring its data.

The enthusiasm for precise measurement developed into a major field of research in itself. The justification of its relevance to teachers was based on two beliefs.

First, it was claimed that effective teaching, like effective medicine, depended on accurate diagnosis. If a teacher could find out exactly where a child's areas of ignorance or confusion lay then the teacher would know exactly how to remediate the problem and release the child's natural desire to learn. Generations of remedial reading and remedial mathematics research were based on this claim, as is the current fascination with identifying children's misunderstandings.

Second, it was claimed that effective teaching was a matter of individualisation. One of the major problems of traditional teaching methods was that they were insensitive to important differences between children. Effective testing could provide the teacher with the information

needed to plan programmes that were suited to each child's strengths, interests and needs.

This belief has led to a continual search for new and more valid constructs describing the essential characteristics of children's abilities and aptitudes. Children have been variously classified as introverted or extraverted, field-dependent or field-independent. reflective or impulsive, visual or verbal, other-directed or inner-directed, right-brain dominant or left-brain dominant, and so on. There is now an almost endless catalogue of these aptitude or personality constructs each with its own tests designed to classify children into the appropriate categories. Each implies the promise that once teachers have made the right diagnosis, effective teaching and learning is assured.

Like the research on child development, those who claim that effective diagnostic measurement will lead to more effective teaching presume that teachers already have a repertoire of effective teaching methods available to use. They presume, for example, that children who are classified as thinking visually are best taught through visual methods, and that teachers have available effective visual teaching methods that can be applied once this diagnosis has been made.

Basic Psychological Laws of Learning

The search for the basic "laws of learning" is now of more historical than practical interest. It has been claimed that there are a small number of basic and fundamental laws of learning. These laws can only be discovered by the rigorous methods employed by research psychologists working in carefully

controlled laboratory environments, usually with less complex mammals than humans. Effective teaching involves the creative application of these "laws" in the classroom.

There is now clear evidence that classroom learning, like all human learning, is part of the context or system in which it is occurring. The only place to study student learning is in the classroom itself. With the exception of Skinner's "law" of operant conditioning, which has been successfully studied in the classroom, all of the other attempts at identifying and applying basic laws of learning were of no practical value to teachers and have been largely forgotten.

Research on Teacher Personality

It has always appeared to be self-evident that an important aspect of effective teaching is the teacher's personality. Paper and pencil tests of personality emerged from the growth of the testing movement in the 1930's and it was not long before attempts were made to apply these personality tests to teachers, and to the prediction of teaching effectiveness.

Although considerable research was carried out on the assessment of teacher personality, no consistent relationships were ever found between any of the measures of teacher personality and student learning. Even such apparently significant aspects of a teacher's personality as a teacher's intelligence or beliefs about children and their learning processes, proved to have no relationship to student learning.

Two important things were, however, learned from this research. The first was that it was a mistake to confuse teaching with the teacher. As I have

indicated above, although it may be appropriate for administrators, it is not appropriate for researchers to treat teachers as fixed variables. A teacher can be more effective with one child and less effective with another. A teacher's performance can vary from day to day, and from topic to topic. Consequently a teacher's personality is only relevant to a specific time, place and child.

Second, and closely related to the first point, it was found that the most promising measures of teacher personality were those that were based on direct observation of the teacher interacting with children. It became clear that the teacher's personality, as it affected children, consisted of the actions and responses or lack of actions and responses that the child perceived and reacted to. The best way to identify a teacher's personality, as it affected the child, was to observe and record what the teacher did, rather than give the teacher a personality test. This outcome of research on teacher personality was the source of the first attempts to develop methods of systematic observation in classrooms (Medley, 1972).

Comparative research on teaching methods.

Thorndike's first textbook on the psychological principles of teaching, published in 1906, contains in the final chapter a vision of the new "scientific study of teaching". For Thorndike, this scientific study of teaching meant testing the effects of every known teaching method. Pedagogical science, he claimed, would be built up from the accumulated results of these scientific tests (Thorndike, 1906).

It is still the case that many think of teaching research as the testing of alternative methods of teaching, gradually eliminating those that prove less

effective and encouraging the use of those that prove to be the most effective. Should we begin teaching reading by phonic or whole word methods? Should we teach science concepts by the discovery or deductive methods? Which methods should we use to teach arithmetical subtraction?

There have now been many hundreds of research studies designed to test the effects of alternative teaching methods. Some of these studies have been very elaborately designed with careful controls over every conceivable contaminating factor (e.g. Worthen, 1968).

For making a specific decision about what teaching policy to follow in a school at a particular time, this kind of research has been useful. For producing general conclusions about the most effective ways of teaching, the results have been universally disappointing. Whenever there have been enough studies carried out about a particular method in different contexts to reach a general conclusion, the results have been evenly split between the method and its competitors, with some tendency for the earlier studies to favour the new method and for later studies to favour its competitors (cf. Herman, 1969)

The reasons for this are not difficult to identify once it is understood that there is no such *thing* as a teaching method. It is only rarely that you can get teachers working with different ages and abilities of children in different school contexts to perform in exactly the same way and for them all to call what they do by the same name. The fact is that teaching is an interactive activity that is responsive to constantly changing circumstances, unless the teacher is totally obsessive or unaware of, and unresponsive to, student

reactions. And even then the personal significance and effect of what the teacher is doing will be different for every student.

Attempts to make comparative teaching methods research sensitive to the realities of classroom events have shown that the only way to know how a teacher is teaching is to make direct and continuous observations. Such observations have shown that what one teacher calls, for example, "process writing", bears only a passing resemblance to what another teacher calls by the same name. Which is why the results of comparative studies which assume that teaching methods with the same name involve the same classroom experiences have not produced any useful general conclusions about teaching.

Research on the Effects of Out-of-School Variables

More recently it has become popular to see the problems that teachers face as being a product of the mismatch between (a) what they do in classrooms and (b) the social, cultural or home backgrounds of the children they teach.

For example, it has been claimed that teachers are middle class, white, european and operate in their classrooms on the basis of values that reflect their cultural origins. The forms of organization and management they use, the ways they interact with their students, their perceptions of knowledge and skill, of success and failure are all culturally prejudiced.

Some of the research generated by this view has led to detailed analyses of the home and cultural environments of children and has focussed the blame for student failure on the home, the parents, or the cultural context in which the child is living. Such research has, like several of the other

types of research respresented in Figure 1, diverted attention away from the classroom and the nature of teaching itself.

Other research generated by this view has led to closer observation of the social (e.g. race, gender) interactions that take place in classrooms and has added an important new dimension to the observation-based research which is represented at the bottom of the Figure 1 (cf. Alton-Lee, Nuthall & Patrick, 1987; Newton, 1989)

Direct Observation based Research

The last thirty years has seen the emergence of research which has attempted to look directly at learning and teaching in classrooms and tried to make sense of school learning processes in ways which will be genuinely useful to teachers by being grounded in the reality of the classroom. The emphasis on direct and detailed observation grew out of lessons learned from the failure of many of the "blind alleys" depicted in Figure 1.

However, commitment to classroom based research has not been enough. It has taken the last thirty years of developing this research to learn that simply carrying out observations and interviews and making detailed recordings is not, in itself, enough. A much broader perspective of data, of how to analyze data, and of how to reproduce it in ways that would be genuinely useful to teachers, has had to be developed.

Changes in Classroom-Based Research on Teaching

The changes in that have taken place in classroom-based research on teaching during the last thirty years have been summarized in Figure 2.

Insert Figure 2 about here

Observational Studies Following the pioneering studies of Anderson (1939) and Jayne (1945), there was during the 1960s a rapid increase in the number of studies involving systematic observing, recording and coding of teacher and student behaviors in classrooms. The researchers involved in these studies found that there was a great deal to be discovered about what went on in ordinary classrooms. So much so that many felt that simply charting, in some detail, and from many points of view, what teachers and students were doing in the classroom would in itself create a revolution in teaching and teacher training. Something of the same enthusiasm has recently re-emerged in studies of gender and race effects in the classroom.

However, implicit in these studies were assumptions about the significance of classroom behaviors for student learning. It soon became apparent that data needed to be gathered about the actual effects of teacher and student behavior on children's learning and attitude change.

Correlational Studies The first studies of the consequences of teacher behavior were carried out in the early 1970s and used correlational designs. They involved recording what went on in classrooms during the course of normal daily activities and obtaining independent measures of student learning or attitude changes. Recorded behavior frequencies were then

correlated with measures of the changes occurring in students, and corrected in various ways for what the children already knew, for differences in ability, and anything else that the researcher thought needed to be taken into account (cf. Wright & Nuthall, 1970)

By the middle of the 1970s there were those who argued that there were important limitations to interpreting the findings of correlational studies for teachers. There could well be other hidden variables not observed in the studies that were creating the apparent correlations. This "third" or "hidden" variable problem was especially acute when only a narrow range of behaviors was observed. For example, a researcher might focus on the frequency of higher-order questions asked by the teachers and attempt to relate that frequency to a measure of student learning. The results might show a correlation, but something else, such as the feed-back the teachers were giving to student answers to the higher-order questions, or the fact that teachers only asked higher order questions in high ability classes, might have been causing the apparent correlation with learning.

Experimental Studies This criticism led to the introduction of experimental studies in which very detailed and specific control was exercised over what the teachers were doing in classrooms. Teachers were carefully trained or scripted to interact with their children in specific ways and careful observations were made of what actually happened.

While some believed that very carefully designed experimental studies represented the ultimate in the application of scientific method to research on teaching, others were claiming that the whole attempt to perfect objective methods of research on teaching was mistaken. Reality, the critics

claimed, was essentially subjective and personal. Teachers and students live and interpret the world through their own perceptions and meanings. Research which ignores this individual and interpretive reality is pointless.

Interpretive Studies The force of this criticism led many to turn completely away from "process-product" research in classrooms (represented by correlational and experimental studies) and to focus their research on personal interviews with teachers and students, and on intensive observation of single individuals. Alternative interpretive methods of processing data were developed which attempted to preserve and enlighten the reality of individual subjective experience (cf. Bolster, 1983)

These interpretive studies have led to fascinating new insights into the perceptions and processes occurring in the minds of students and teachers which has matched the behavioral discoveries of the early observational studies. To many it has opened an exciting new world of research more closely aligned to their view of the significance of classroom experience. Many teachers who read or participate in this kind of research find that it reflects their reality much more closely that the so-called objective process-product research.

Combining Alternative Paradigms Interpretive research also has its problems. Like the early observational research, real connections need to be made between the experience of teachers and students in classrooms and the consequences or effects of that experience.

This has led a number of researchers to explore the possibility of bringing together the objective, the interpretive and the radical methodologies in

classroom research. Gage has recently described this as the "battle of the paradigms" and makes a plea for "an honest and productive rapprochement between the paradigms" (Gage, 1989) The research which Dr Alton-Lee initiated at the University of Canterbury and we have been engaged in for the last five years has been an attempt to develop new research procedures incorporating alternative methodologies in the same research project (Alton-Lee & Nuthall, 1990).

In the final section of this paper, I would like to present a picture of what I believe research on teaching should be like if it incorporates the lessons that can be learned from the mistakes or inadequacies of past research. I want to step back from the debate about methods of research and data analysis and look at what the methods we use should be trying to achieve. What is it that constitutes the outcome or end-product of genuinely facilitative research on teaching? The criticisms of past research that I have described in the first part of this paper have all arisen because the product of past research has not turned out to be useful for teachers. The methods used in past research have been the "correct" methods when judged by criteria appropriate to academic or interest groups other than teachers. The question is, what kind of criteria are appropriate for judging the usefulness of research to teachers? In my view this requires deciding first what kind of useful or facilitative knowledge or information you expect the research to produce. The remainder of this paper is an attempt to describe the nature of that knowledge.

First there are two points that need to be made about the appropriate outcome of research on teaching before going into the detail of what that outcome should look like.

Open-ended Knowledge. The first point is that what we are looking for is open-ended pragmatic knowledge. By this I mean knowledge about what to do and why you might do it, which is capable of infinite expansion as new ways of teaching and working with children are created. It is knowledge which contains in itself both the theoretical and the practical.

The Interactive Nature of Classroom Processes. The second point is that research on teaching should produce knowledge which takes full account of the complexity of what a teacher has to know and do in the classroom. In the past we have taken very naive views of how people plan and act. For example, there are studies which show that the frequency with which teachers ask "closed" questions is correlated with higher achievement scores in students (cf Wright & Nuthall, 1970). This has been taken to mean that teachers should ask more "closed" questions if their students are to learn more. This interpretation is based on the naive view that "closed" questions are a simple cause, and that more learning in students is a simple and direct effect of that cause.

Classroom interaction, however, like any human interaction, involves a continuous awareness or monitoring of each persons actions and reactions. For example, consider what happens during normal conversation. One person says something and as they are speaking, they monitor the reactions of the listener for clues to indicate whether they are being understood or not. Any looking away, frowning, etc. on the part of the listener that indicates incomprehension or boredom leads the speaker to change the wording or emphasis, to repeat or use any of the other corrective actions that are permissable moves in polite conversation. Underlying this monitoring and corrective action lies a sense or model of what we expect an interested and comprehending listener to be doing or looking like, and a knowledge of the effects of using a variety of different forms of corrective conversational moves. Anyone who is aware of the hundreds of different linguistic forms which a native English speaker can use to make a request,

will understand how complex and sophisticated normal patterns of social interaction are.

The reciprocal nature of this constant monitoring and corrective action means that causes are in constant interaction with effects until the two become virtually indistinguishable. Research on teaching, like any research that attempts to explain human behavior, must start from the premise that the classroom behavior arises from continuously interactive communication between participants and is consequently highly complex.

A Model of the Knowledge Outcomes of Research on Teaching.

Figure 3 provides an overview of the structure of knowledge that facilitative research on teaching should be able to produce. What is important about this model is that takes account of the interactive nature of the classroom, that it is complex but does not include anything we do not already know is involved in classroom interaction. It is intended to include the practical techniques or tactics that teachers can use, the visible signs that can be used to monitor and diagnose the underlying learning processes that are occurring, the general and specific theories that describe the underlying learning processes, and the ways these processes work.

Insert Figure 3 about here

The box on the left side of the figure represents the underlying theories which describe and explain the general learning and social processes that take place in classrooms. These include, for example, the things we know about how memory works in children, the nature of understanding and misunderstanding concepts and how these relate to and affect memory and the development of knowledge, how a sense of competence develops in children and how this is affected by experiences of competition and co-operation, reward and punishment, how social roles are learned and affected by social interaction with peers and adults, and so on..

The two boxes on the right side of the figure represent the specific tactics or techniques that teachers use to set up and carry out their programmes and the monitoring signs that teachers use to identify or diagnose how children are carrying out, understanding, or becoming involved in the tasks or activities that have been set up for them. These two boxes are the components of day to day life in classrooms. They represent what, in detail, teachers and students do, and how teachers monitor and interact with the way children are experiencing and processing classroom tasks.

The horizontal boxes, in the middle of the figure, represent the learning and social processes that underly each of the activities that occur in the class. They describe the reasons why a teacher might carry out a particular activity (the objectives), what a teacher can expect to happen as a result of that activity, and why a particular outcome will occur.

The upper of these two horizontal boxes contains the objectives, principles and explanations that relate to cognitive learning processes i.e. when children are learning new concepts in science or social studies. The

appearance of underlying boxes behind this box is intended to indicate that there are many more of these which are specific to different kinds of learning and social processes. For example, there are a different set of objectives, principles and explanations that relate to the way children's interests and attitudes develop and change, that relate to the learning of mathematical skills, and so on. The foregrounding of cognitive processes in this and subsequent figures is not intended to suggest they are more important, simply that they have been the focus of some of our own research and I am more familiar with the research in this area.

The lower horizontal box is an attempt to indicate that there are parallel sets of principles and explanations that relate to classroom organization and the management of more general teaching strategies. For example, there are separate sets of objectives, principles and explanations that relate to the use of small groups, to managing a class discussion, to setting up individual task activities, etc. Many of these pedagogical and social principles are general to many different content areas and relate to the learning of more general academic and social skills such as study skills, learning to work cooperatively or independently, developing self concepts of academic competence, etc.

The box at the bottom of the page represents the sets of examples of actual teaching situations that need to be included as part of the knowledge included in the model. These serve to give concrete reality to the more abstract parts of the knowledge structure, to show how the various components all fit together, and are themselves the product of specific research studies so that the validity of the material in the knowledge

structure can be demonstrated with actual data (both quantitative and qualitative).

There is not the space in this paper to go into each of these components in anything like the detail needed to understand what might be included in them, but the following four figures are intended to provide sufficient of that detail, as it relates to one area (the acquiring of knowledge or new concepts), to make the model less abstract and to indicate that it is intended to represent practical knowledge.

Figure 4 details some of the specific cognitive learning principles that are involved in teaching new concepts, and some of the things that need to be achieved if the learning is to be effective.

Insert Figure 4 about here

The details in the two boxes across the top of the figure are intended to indicate that, because new concepts are built up from the parts of known concepts, it is necessary for the teacher to identify what these concepts are and to check that the children have these background concepts available for use. Thus, these two boxes identify the first part of what a teacher needs to know in order to plan and carry out an effective strategy for teaching new concepts. The boxes further down the page represent some of the further principles and explanations that a teacher needs to know in order to develop effective strategies.

Figure 5 sets out some of the pedagogical principles and explanations that underly two of the many different types of organizational structures that teachers might make use of in implementing their teaching strategies. For example, the top half of the figure represents some of the principles and explanations that relate to the setting up of structured task activities.

Insert Figure 5 about here

A teacher might, for instance want to get her students to record the length and direction of shadows made by poles in different parts of the school playground at different times during the day. That task would be more effective if the teacher made it quite clear to the students what the purpose of the activity was, and the steps they needed to carry out in order to complete the activity. Doing this will ensure that students work hard at the task, do not spend unproductive time trying to understand the task, will find the task more rewarding and will be more interested in such tasks in the future

Figure 6 lists some of the repertoire of tactics or specific techniques that a teacher can use to achieve the objectives detailed in the previous boxes. The information provided in each of the boxes in Figure 6 is the information a teacher needs in order to make informed selections from the available repertoire. Each box includes a precise description of the tactic itself, the things that the tactic is likely to achieve, and the problems that are likely to arise in implementing the tactic.

Insert Figure 6 about here

Note that each box specifies a version of the tactic designed for students of a particular age. Further specifications about appropriate student backgrounds, subject areas being taught, and so on, are probably needed. Separate versions of each tactic are needed for other types of children, and other subject areas. This list is open-ended and added to as teachers invent new ways of doing things and introduce new classroom technology.

Finally, Figure 7 lists the signs that teachers use to monitor the state and progress of their class programmes. This list can be very long and will vary with the nature of the activities that are occurring, but there are some visible signs or symptoms which are relatively easy to identify and have greater functional significance for identifying and monitoring the underlying mental and emotional processes of students.

Insert Figure 7 about here

The interpretation of these signs depends on the contexts and patterns in which they occur. Specific combinations are needed to identify the possible existence of underlying states of mind or feeling. These underlying states are the learning processes and their associated consequences and problems which are instigated or affected by the tactics the teacher is using. These underlying states, in turn, relate back to the longer term learning outcomes that the teacher is intending to achieve. It is knowledge of these underlying states that the teacher uses to make moment-by-moment decisions about what to do next with her students.

For example, one of the difficulties of not providing students with a statement of task objectives is that they may get confused about what to do in a task. If the teacher sets a task, she should be alerted to look for students who appear to sit idly flicking through pages, spend long periods working on the cover of their folder, and other related signs. If she observes this pattern of signs occurring, then a possible diagnosis is task confusion and a possible remedy is to take time to clarify with the students their understanding of what the task is about.

Summary of the Model of Research-based Knowledge about Teaching.

The purpose of Figures 3 to 7 has been to create a model of the knowledge structure which should be the outcome of facilitative research on teaching. It is unashamedly a complex picture because I do not believe that we can capture, in any simple way, all that we need to know in order to give teaching a sound research base.

Such a knowledge structure should be able to tell a teacher the general learning processes that underly classroom activities, and for the specific tasks or activities, it should be able to tell her the specific learning processes that are involved. It should be able to tell a teacher what she should be aiming for in any specific task and to provide her with a range of general strategies and specific techniques or tactics that she can use to achieve those aims. Just as importantly, it should let the teacher know, by helping her to identify what is happening to the students, how she can tell whether her techniques are achieving their desired outcomes or not, and what

alternatives she should consider using if they are not. In other words, this knowledge should give teachers an insight into what is happening and why, and what they should do about it. This is what I meant when I made the point earlier in the paper that the research should produce knowledge that was both pragmatic and facilitative.

The Implications of This Model for Research on Teaching

I indicated at the beginning of this section of the paper that the purpose of this model of the outcomes of facilitative research on teaching was to provide a standard or set of criteria for judging the value that research on teaching might have for teachers. I want now to explore what it means to use a model like this for judging research on teaching.

First, it is not my intention to claim that all research on teaching ought to incorporate all of the elements of this model in any one study or series of studies. What needs to be examined is what a particular study does and does not contribute to the structure of knowledge represented by this model. Significant research should contribute to the building up of the connections that can be made between the components of the model.

Most studies of teaching which purport to have implications for practice focus on one or other detail of this model and leave the rest to speculative inference. For example, consider a typical study, using a traditional design, carried out on student participation in class discussion (e.g. answering and asking questions, making comments) and its relationship to the social class origins of the students. The study uses observation and measurement

procedures of established reliability in randomly selected sample or urban elementary school classrooms. It is found that children from low income homes participate in class discussion less often, but are reprimanded by the teacher more frequently, than students from higher income homes.

The report of such a study would typically contain an accurate tabulation of the observational data (frequencies of question answers, comments, etc.). Then in the discussion section of the report the authors would typically claim their results were important because lower rates of participation lead to lower pupil learning and a lower sense of self worth. The discussion would then claim or imply that teachers should increase the rates of participation of children from lower income families. Such discussion is, however, purely speculative, and while it may, in some simple sense, be 'grounded' in the data, it is subject to no rules of verification.

The same problems also occur in studies using ethnographic and interpretive paradigms. Consider a typical study involving intensive and long-term study of classroom interactions between four teachers and their students. Formal and informal participant observations are supplemented with interviews with teachers and students about their perceptions of the reality and significance of their classroom experiences. The author's expertise in interpreting the gender and class significance of the participant's experience flows over into speculative claims about why teachers act the way they do, implications for the wider society and admonitions about what teachers should do about it.

Reports of this kind, which are not uncommon in observational research on teaching, use the data as an excuse for presenting unexamined assumptions

about the nature of learning and attitude change in students, about how the classroom interaction system works, about what teachers should do about changing the nature of that interaction, and about the consequential effects of making and managing those changes.

In my view, all speculative discussion of underlying processes and causes and effects, and all claims about what teachers should be doing, need to be identified and subjected to the same kind of rigorous and systematic research procedures that were focussed on obtaining the original data. Otherwise, data gathering has been used by the researcher as the vehicle for propounding opinions. The implicit assumption is that the researcher has the authority to propound these opinions, the research evidence to justify them, and the moral right to use information obtained from children and teachers in this way. Teachers have a right to reject this assumption.

We have good models for guiding and evaluating the collection and quantitative interpretation of data. We have no models for guiding and evaluating the theoretical and practical interpretation of data and the collation of independent studies into a systematic body of useable knowledge.

Second, this model of the knowledge structure that research on teaching should produce is not intended to imply the superiority of any particular research method or class of research procedures. Some research procedures are better at illuminating the personal experiences and underlying processes that occur during specific classroom activities. Other methods are better at identifying the connections that exist between specific experiences and long-term outcomes, or between specific experiences and the general

characteristics of classrooms. Those with radical perspectives on the nature of schooling have had an important impact on the focus of more recent research on teaching, but have had little to contribute to the way significant social variables ought to be studied in the classroom.

It should also not be taken to imply that professional researchers are the only people who can undertake this research. Once we are clear what it is we are looking for, then the legitimate roles of both teachers and researchers in contributing to this knowledge can be worked out.

Conclusion

If research on teaching is to achieve its potential as a source of genuinely facilitative knowledge which can inform, enlighten, and guide the work of teachers then it must focus on achieving the completeness that I have attempted to describe in this model. Its methodologies, its products, and its practitioners, must be judged against such a picture.

If teachers understood that this kind of pragmatic, facilitative knowledge was the purpose of research on teaching then I believe the basis would be built for a genuine partnership between the teaching profession and researchers in which neither claimed to have expertise or knowledge for which they had no warrant.

Notes

1. Although not specifically referred to in this paper, a lot of the ideas reported have been developed during work done on the the Understanding Learning and Teaching Project at the University of Canterbury. I would also like to thank Dr. Alton-Lee for helping in the preparation of this paper.

2. Those interested in recent summaries of research on teaching will find the following two references useful:
Richardson Koehler, V. *Educators' Handbook: A Research Perspective* (New York: Longman, 1987). This is an informal book containing questions and answers about effective teaching and classroom management.
Wittrock, M. *Handbook of Research on Teaching: Third Edition* (London: Collier Macmillan, 1986) This Handbook contains excellent general summaries by Brophy & Good (Teacher Behavior and Student Achievement), Rosenshine & Stevens (Teaching Functions) and Doyle (Classroom Organization and Management), as well as chapters which detail the research in the areas of reading, written composition, mathematics, natural sciences, arts and aesthetics, values, and social studies.

3. Those interested in following up methodological issues in research on teaching will find the following two articles useful:
Shulman, L. Paradigms and research programs in the study of teaching.
Biddle B. & Anderson, D. Theory, methods, knowledge, and research on teaching.
(These are both chapters in the *Handbook of Research on Teaching: Third Edition* (ed. M. Wittrock) referred to in the previous note.

References

Alton-Lee, A. & Nuthall, G. (1990) Student experiences and student learning in the elementary school classroom: an illustration of a generative methodology. *Teaching and Teacher Education: An International Journal of Research and Studies* Vol.6, No.1

Alton-Lee, A., Nuthall, G., & Patrick,J. (1987) Take your brown hand off my book. SET: Research Information for Teachers, 1987, No.1, Item 8. Wellington, NZCER.

Anderson. H. H. (1939) The measurement of dominative and socially integrative behavior in teachers' contacts with children. *Child Development 10*, 73-89

Barr, A.S., Torgerson, T.L., Johnson, C.E., Lyon, V.E., Walvoord, A.C. (1935) The validity of certain instruments employed in the measurement of teaching ability. pp.71-141 in W.H. Lancelot (ed.) *The Measurement of Teaching Efficiency*. New York, Macmillan

Bolster, A. S. (1983) Toward a more effective model of research on teaching. *Harvard Educational Review 53*, 294-308

Cornman, O.P. (1902) Spelling in the elementary school: an experimental and statistical investigation *Experimental Studies in Psychology and Pedagogy. Vol 1* Psychological Laboratory of the University of Pennsylvania

Gage, N. L. (1989) The paradigm wars and their aftermath. A "historical" sketch of research on teaching since 1989. *Educational Researcher 18*, No.7, 4-10

Herman, G. (1969) Learning by discovery: a critical review of studies. *The Journal of Experimental Education 38*, 58-72

Jayne, C.D. (1945) A study of the relationship between teaching procedures and educational outcomes. *Journal of Experimental Education 14*, 101-134

Jackson, P. W. (1968) *Life in Classrooms* New York: Holt, Rinehart, Winston

Medley, D. M. (1974) Early history of research on teacher behavior. In N. Flanders & G. Nuthall (ed.s) *The Classroom Behavior of Teachers.* Special number of the *International Review of Education,* XVII, 430-439

Newton, K. (1988) Who's getting teacher attention, what sort and why? *Feminist Teachers* 29, 2 -6

Nuthall, G. & Alton-Lee, A. (1982) *Measuring and understanding the way children learn in class.* Technical Report No.1, Understanding Teaching and Learning Project, University of Canterbury (ERIC Documentation Reproduction Service No. ED 222 572)

Nuthall, G. & Alton-Lee, A. (1990) Research on teaching and learning: Thirty years of change. *Elementary School Journal* Vol. 91, in press.

O'Shea, M. V. (1906) Tendencies in child and educational psychology *Psychological Bulletin*, Vol 3, No.2,.357-363

Stodolsky, S. (1984) Teacher evaluation: the limits of looking. *Educational Researcher, 13,* (November) 11-18

Thorndike E.L. (1906) *Principles of Teaching* New York:Seiler.

Worthen, B. R. (1968) Discovery and expository task presentation in elementary mathematics. *Journal of Educational Psychology Monograph Supplement* 59: No.1, Part 2.

Wright, C. J. & Nuthall, G.A. (1970) Relationships between teacher behaviors and student achievement in three experimental elementary science lessons. *American Educational Research Journal 7,* 477-491.

Young Loveridge, J. M. (1989) The development of children's number concepts: the first year of school. *New Zealand Journal of Educational Studies 24,* 47-64

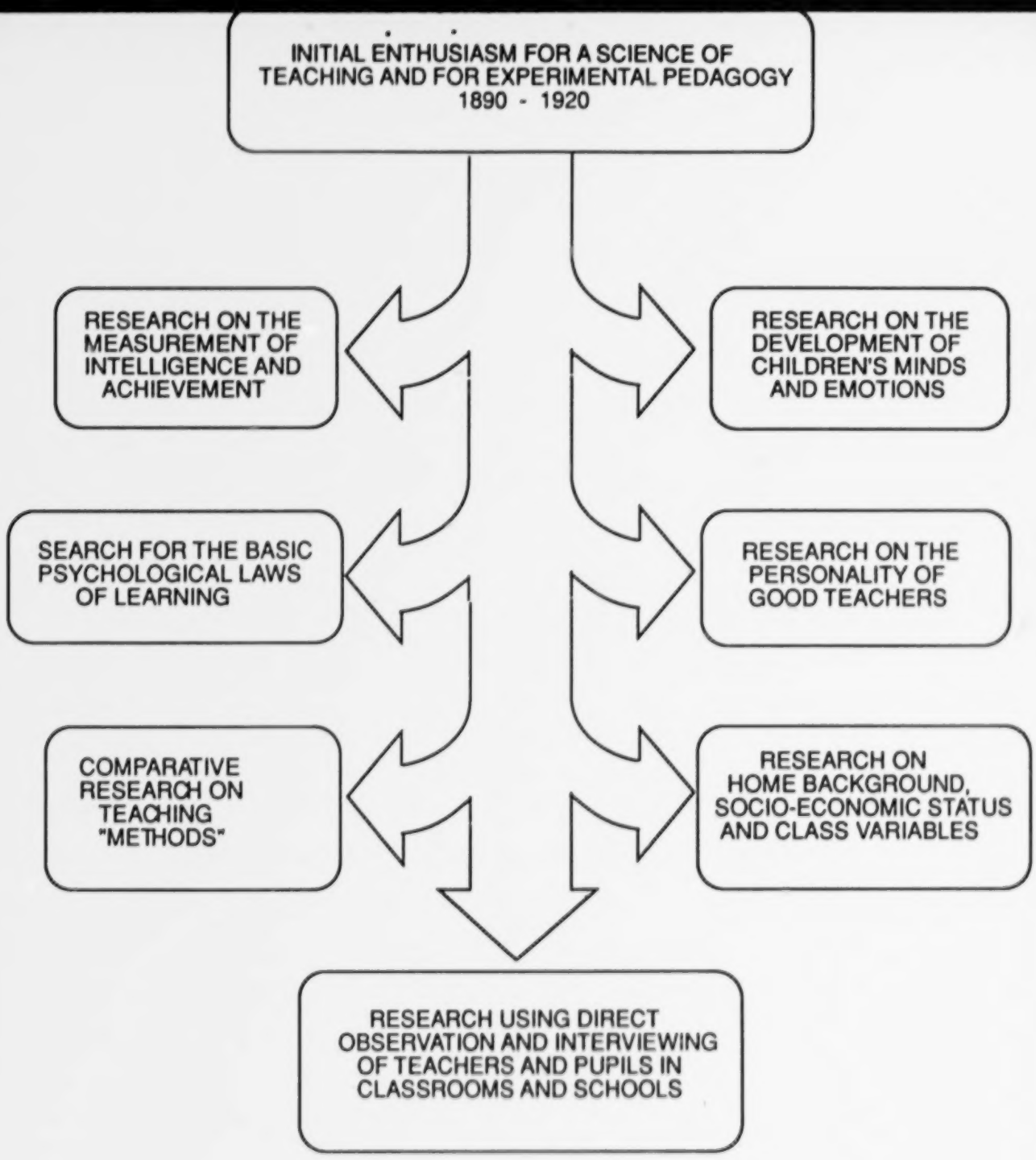

INITIAL ENTHUSIASM FOR A SCIENCE OF TEACHING AND FOR EXPERIMENTAL PEDAGOGY 1890 - 1920
RESEARCH ON THE MEASUREMENT OF INTELLIGENCE AND ACHIEVEMENT
RESEARCH ON THE DEVELOPMENT OF CHILDREN'S MINDS AND EMOTIONS
SEARCH FOR THE BASIC PSYCHOLOGICAL LAWS OF LEARNING
RESEARCH ON THE PERSONALITY OF GOOD TEACHERS
COMPARATIVE RESEARCH ON TEACHING "METHODS"
RESEARCH ON HOME BACKGROUND, SOCIO-ECONOMIC STATUS AND CLASS VARIABLES
RESEARCH USING DIRECT OBSERVATION AND INTERVIEWING OF TEACHERS AND PUPILS IN CLASSROOMS AND SCHOOLS

Figure 1. A Brief History of Research on Teaching

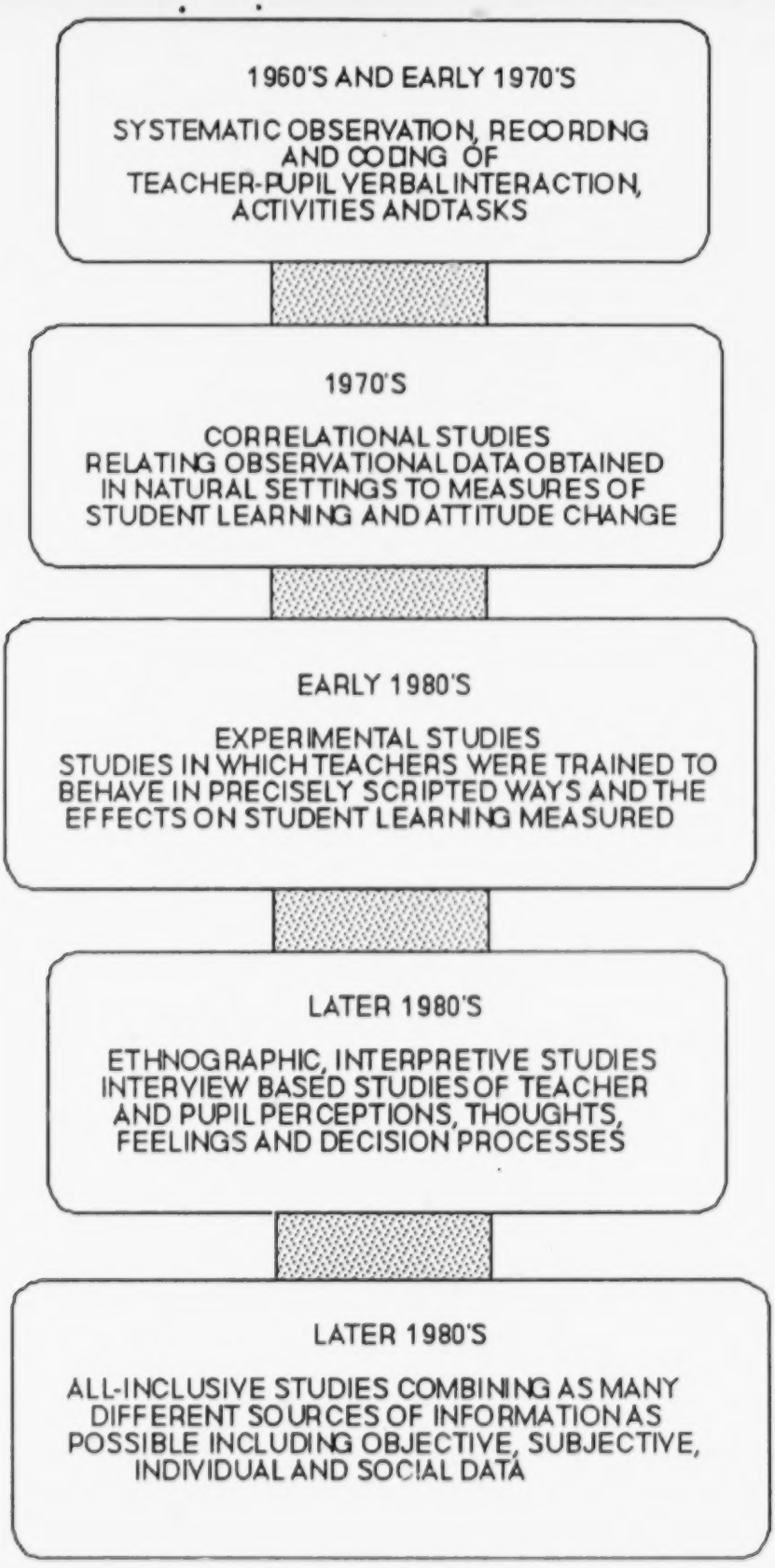
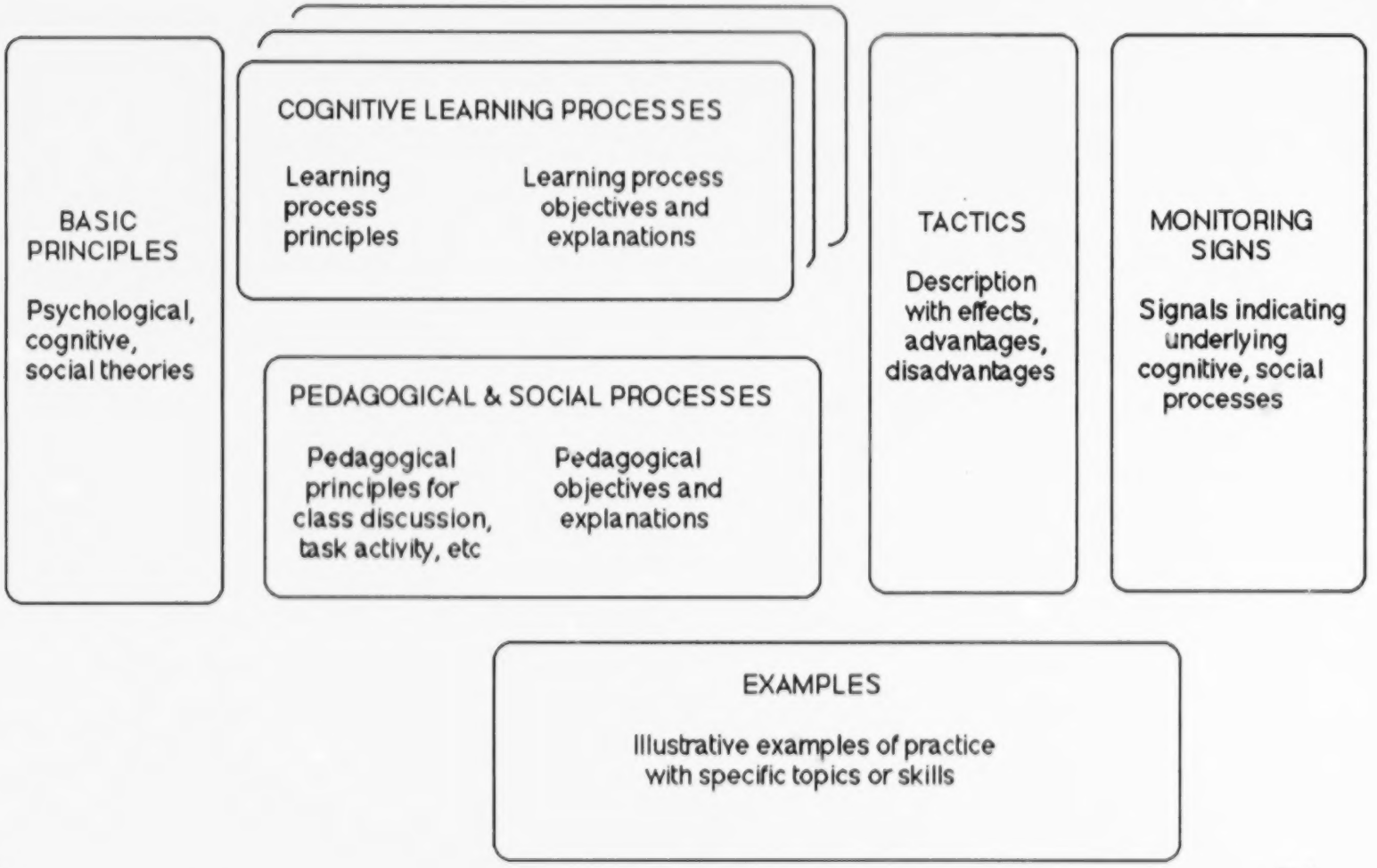

1960'S AND EARLY 1970'S
SYSTEMATIC OBSERVATION, RECORDING AND CODING OF TEACHER-PUPIL VERBAL INTERACTION, ACTIVITIES AND TASKS
1970'S
CORRELATIONAL STUDIES RELATING OBSERVATIONAL DATA OBTAINED IN NATURAL SETTINGS TO MEASURES OF STUDENT LEARNING AND ATTITUDE CHANGE
EARLY 1980'S
EXPERIMENTAL STUDIES STUDIES IN WHICH TEACHERS WERE TRAINED TO BEHAVE IN PRECISELY SCRIPTED WAYS AND THE EFFECTS ON STUDENT LEARNING MEASURED
LATER 1980'S
ETHNOGRAPHIC, INTERPRETIVE STUDIES INTERVIEW BASED STUDIES OF TEACHER AND PUPIL PERCEPTIONS, THOUGHTS, FEELINGS AND DECISION PROCESSES
LATER 1980'S
ALL-INCLUSIVE STUDIES COMBINING AS MANY DIFFERENT SOURCES OF INFORMATION AS POSSIBLE INCLUDING OBJECTIVE, SUBJECTIVE, INDIVIDUAL AND SOCIAL DATA

Figure 2. Changes in Research on Teaching During the Last Thirty Years

Figure 3. A Model of the Knowledge Produced by Facilitative Research on Teaching


BASIC PRINCIPLES
Psychological, cognitive, social theories
COGNITIVE LEARNING PROCESSES
Learning process principles
Learning process objectives and explanations
PEDAGOGICAL & SOCIAL PROCESSES
Pedagogical principles for class discussion, task activity, etc
Pedagogical objectives and explanations
TACTICS
Description with effects, advantages, disadvantages
MONITORING SIGNS
Signals indicating underlying cognitive, social processes
EXAMPLES
Illustrative examples of practice with specific topics or skills

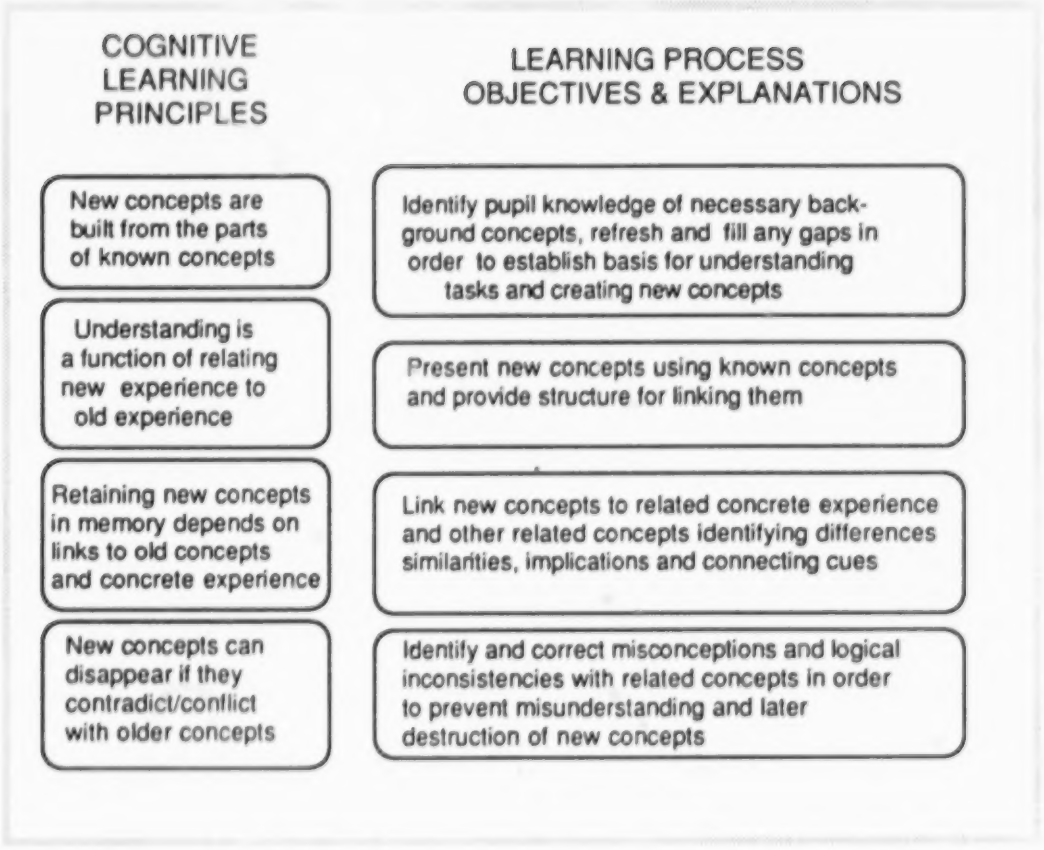

COGNITIVE LEARNING PRINCIPLES
LEARNING PROCESS OBJECTIVES & EXPLANATIONS
New concepts are built from the parts of known concepts
Identify pupil knowledge of necessary background concepts, refresh and fill any gaps in order to establish basis for understanding tasks and creating new concepts
Understanding is a function of relating new experience to old experience
Present new concepts using known concepts and provide structure for linking them
Retaining new concepts in memory depends on links to old concepts and concrete experience
Link new concepts to related concrete experience and other related concepts identifying differences similarities, implications and connecting cues
New concepts can disappear if they contradict/conflict with older concepts
Identify and correct misconceptions and logical inconsistencies with related concepts in order to prevent misunderstanding and later destruction of new concepts

Figure 4. Examples of Principles, Objectives and Explanations for Cognitive Learning Processes

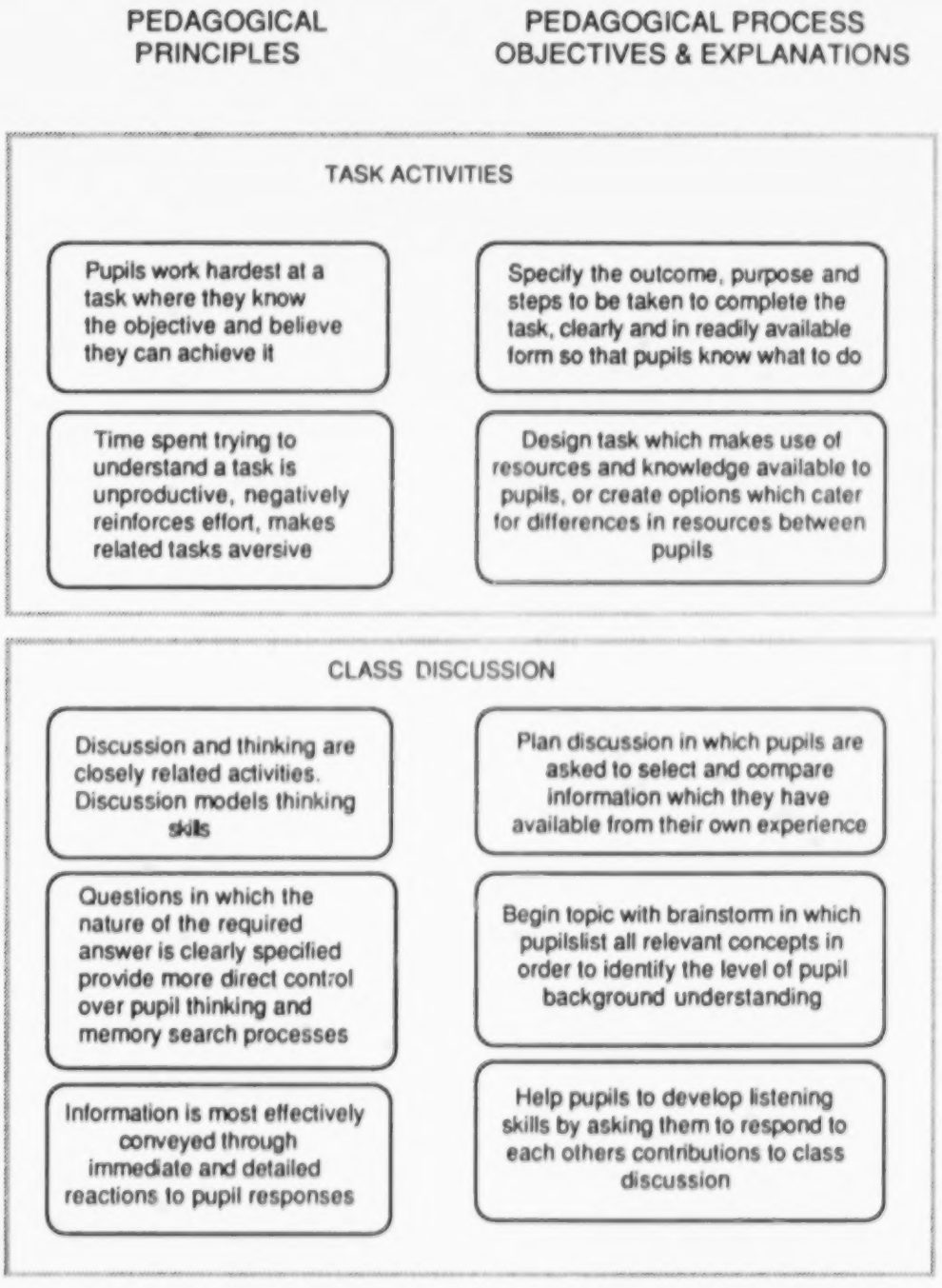

PEDAGOGICAL PRINCIPLES
PEDAGOGICAL PROCESS OBJECTIVES & EXPLANATIONS
TASK ACTIVITIES
Pupils work hardest at a task where they know the objective and believe they can achieve it
Specify the outcome, purpose and steps to be taken to complete the task, clearly and in readily available form so that pupils know what to do
Time spent trying to understand a task is unproductive, negatively reinforces effort, makes related tasks aversive
Design task which makes use of resources and knowledge available to pupils, or create options which cater for differences in resources between pupils
CLASS DISCUSSION
Discussion and thinking are closely related activities. Discussion models thinking skills
Plan discussion in which pupils are asked to select and compare information which they have available from their own experience
Questions in which the nature of the required answer is clearly specified provide more direct control over pupil thinking and memory search processes
Begin topic with brainstorm in which pupilslist all relevant concepts in order to identify the level of pupil background understanding
Information is most effectively conveyed through immediate and detailed reactions to pupil responses
Help pupils to develop listening skills by asking them to respond to each others contributions to class discussion

Figure 5. Examples of Principles, Objectives and Explanations for the Pedagogical Processes Involved in Task Activities and Class Discussions.

. . . . . TACTICS . . . . . .

BRAINSTORM (Version Std 4. A)
Class-as-a-whole. Ask pupils to list all the words/ideas/facts they know related to topic. List on blackboard
+Identify what pupils know
+Arouse interest in topic
+Alert pupils to boundaries for topic content
- Confuse pupils about topic

ASK OPEN-ENDED QUESTIONS
Class-as-a-whole discussion. Ask questions: "What do you know about ...?" "What can you tell me about...? Std 1 - Form 4
+ Challenge pupils to search memory
+ Involve pupils in guided guessing
- Confuse pupils about topic
- Lose the attention on confused pupils

REPORT DISCUSSION IN NOTES ON BLACKBOARD
Class-as-a-whole discussion. List major points made by pupils on Bb Std 3 - Form 4
+ Show pupils structure of topic
+ Provide pupils with notes for later study
+ Ensure pupils get correct information
- Slows momentum and loses attention

PEER DISCUSSION GROUP
(Version Form 2 A)
Pupils divided into groups, 2 girls, 2 boys
Given task description cards detailing required information and answer required
+ Involves active participation of more pupils
+ Topic is handled in pupils' own language
+ Skills of debate, cooperative knowledge selection may be developed
- Passive pupils may be excluded

AND FOR .....

LIBRARY SEARCH

QUIZ

LECTURE

STORY

WORKSHEET EXERCISES

GUIDED READING

DIAGRAM OR CHART

MAKING MODELS

EXPERIMENTS

OBSERVING

RECORDING

KEEPING FOLDERS

ILLUSTRATING

COPYING NOTES

SUMMARIZING TEXT

COMPETITIVE GAMES

ETC.

Figure 6. Examples of Descriptions of Specific Tactics

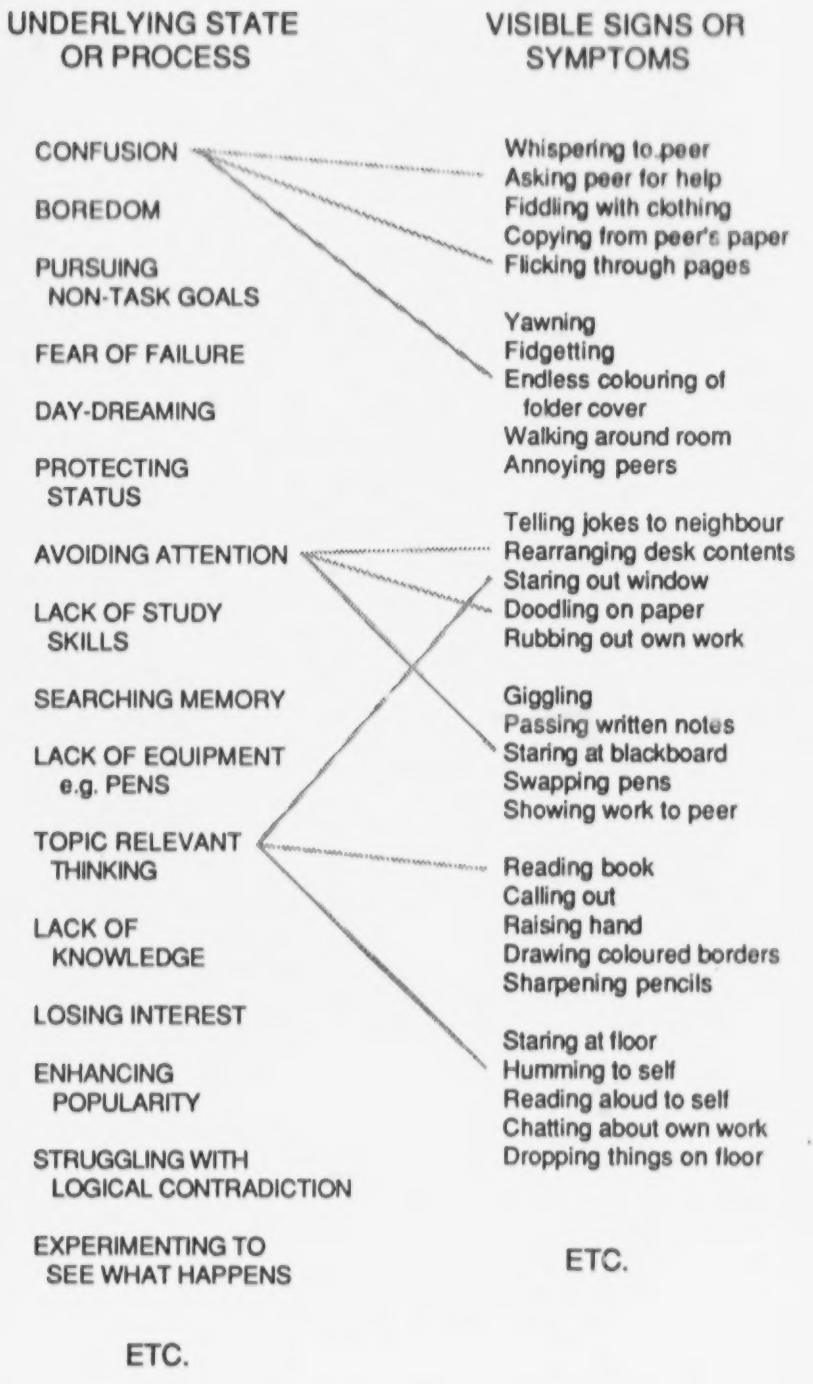


Figure 7. Examples of Visible Monitoring Signs and the Underlying Processes That They Might Indicate.